



SUBSTITUTE CLAIMS

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1. A pressure regulator for connecting a pressure source to an inflatable object, comprising:
 - a hollow casing having a fluid inlet end, a fluid outlet end, and a side wall;
 - a valve system positioned inside the hollow casing;
 - a fluid inlet connected to the valve system, the inlet located at the fluid inlet end of the
 - 5 hollow casing and adaptable for connection to a pressure source;
 - a fluid outlet located at the fluid outlet end of the hollow casing, the outlet adaptable for connection to an inflatable object;
 - a fluid conduit positioned inside the hollow casing between the fluid inlet and the fluid outlet;
 - 10 a pressure-sensing structure attached to the conduit, the pressure-sensing structure movable inside the hollow casing in the longitudinal direction; and
 - a pressure-generating structure disposed inside the hollow casing and attached to the pressure-sensing structure, the pressure-generating structure capable of exerting a bias force upon the pressure-sensing structure in proportion to a desired pressure in the inflatable object,
 - 15 wherein the valve system is actuated by the conduit which moves longitudinally with the pressure-sensing structure in response to the pressure differential between the two sides of the pressure-sensing structure, capable of preventing the force produced by the pressure source from transferring to the pressure-sensing structure when the valve system is in close state.
 - 20 wherein the pressure regulator is capable of inflating the object when the initial pressure inside the inflatable object is lower than the desired pressure, and the pressure regulator is capable of automatically terminating inflation when the pressure inside the object reaches the desired pressure.
- 25 2. The pressure regulator of claim 1, wherein the pressure regulator is capable of deflating the object when the initial pressure inside the inflatable object is higher than the desired pressure, and the pressure regulator is capable of automatically terminating deflation when the pressure inside the object reaches the desired pressure.
- 30 3. The pressure regulator of claim 1, wherein the pressure-sensing structure is a piston.

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4. The pressure regulator of claim 3, wherein the piston is of a lip type.
5. The pressure regulator of claim 3, wherein the piston is an O-ring piston.
- 5 6. The pressure regulator of claim 1, wherein the pressure-generating structure is a coil spring disposed between the pressure-sensing structure and a spring collar.
- 10 7. The pressure regulator of claim 6, wherein the side wall of the hollow casing includes a port between the pressure-sensing structure and the spring collar, and the port is capable of releasing fluid from the inflatable object when the pressure inside the object exceeds the desired pressure.
- 15 8. The pressure regulator of claim 7, wherein the distance between the port and the pressure-sensing structure is proportional to the maximum pressure allowed for the inflatable object.
9. The pressure regulator of claim 1, wherein the valve system is a Shrader valve.
- 20 10. The pressure regulator of claim 1, wherein the valve system is a ball valve.
11. ~~[The pressure regulator of claim 1, wherein the valve system is actuated by the conduit which moves longitudinally with the pressure sensing structure in response to the pressure differential between the two sides of the pressure sensing structure.]~~
- 25 12. The pressure regulator of claim 1, further includes a reed disposed in the fluid flow path.
13. The pressure regulator of claim 12, wherein the reed comprises two sound-generating pieces; the first piece generates a buzzing sound during inflation; and the second piece generates a different buzzing sound during deflation.
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14. The pressure regulator of claim 6, wherein the spring collar is connected to at least one screw which extends outside the side wall of the hollow casing.
15. The pressure regulator of claim 14, wherein the setting for the desired pressure is adjusted
5 by sliding the screw along a longitudinal slot formed in the side wall of the hollow casing.
16. The pressure regulator of claim 14, wherein a bellows is disposed between the spring collar and the fluid outlet.
- 10 17. The pressure regulator of claim 1, further includes a component for presetting the desired pressure in the inflatable object.
18. The pressure regulator of claim 1, further includes a pressure indicator disposed in the hollow casing.
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19. The pressure regulator of claim 18, wherein the pressure indicator is a marker.
20. The pressure regulator of claim 19, wherein the maker is attached to the outside of the conduit.
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21. The pressure regulator of claim 1, further comprising a flow indicator.
22. The pressure regulator of claim 21, wherein the flow indicator is a visual ball display.
- 25 23. ~~[A pressure regulator for connecting a pressure source to an inflatable object, comprising:
a hollow casing having a fluid inlet end, a fluid outlet end, and a side wall;
means for actuating fluid flow in response to a preset pressure, the means for
actuating fluid flow positioned inside the hollow casing;
a fluid inlet connected to the valve system, the inlet located at the fluid inlet end of the
30 hollow casing and adaptable for connection to a pressure source;~~

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~~a fluid outlet located at the fluid outlet end of the hollow casing, the outlet adaptable for connection to an inflatable object;~~

~~fluid passage means positioned inside the hollow casing between the fluid inlet and the fluid outlet;~~

5 ~~a pressure sensing means attached to the fluid passage means, the pressure sensing means movable inside the hollow casing in the longitudinal direction; and~~

~~a pressure generating means disposed inside the hollow casing and attached to the pressure sensing means, the pressure generating means capable of exerting a bias force upon the pressure sensing means in proportion to a desired pressure in the inflatable object,~~

10 ~~wherein the pressure regulator is capable of inflating the object when the initial pressure inside the inflatable object is lower than the desired pressure, and the pressure regulator is capable of automatically terminating inflation when the pressure inside the object reaches the desired pressure.]~~

15 24. A product made according to ~~[any of the preceding claims]~~ claim 1.

25. The product of claim 24, wherein the product is a tire valve.

26. The product of claim 24, wherein the product is a tire valve extension.

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27. The product of claim 24, wherein the product is a flow control device.

28. The product of claim 24, wherein the product is a tire inflating or deflating device.

25 29. A method of inflating or deflating an inflatable object comprising using the pressure regulator according to ~~[any of claims 1-23]~~ claim 1.

30. A method of inflating or deflating an inflatable object, comprising:

30 obtaining a pressure regulator comprising a pressure-sensing structure, a pressure-generating structure, a fluid conduit, and a valve system inside a hollow casing, the valve

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system capable of actuating fluid flow to the fluid conduit according to the difference between a desired pressure and the actual pressure inside the inflatable object;

presetting the desired pressure on the regulator to cause the pressure-generating structure to exert a bias force on the pressure-sensing structure;

5 connecting the pressure regulator to a pressure source and the inflatable object;

effectuating fluid flow from the pressure source to the inflatable object through the fluid conduit if the desired pressure is higher than the initial pressure in the inflatable object; and

10 effectuating fluid release from the inflatable object [~~and through the fluid conduit~~] if the desired pressure is lower than the initial pressure in the inflatable object,

~~[wherein the valve system does not permit fluid flow from the pressure source to the inflatable object when the desired pressure is lower than the actual pressure.]~~

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